“Studies on Impact of Ticks on buffaloes and cattle’s health.”

A

Synopsis

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"Studies on Impact of Ticks on buffaloes and cattle's health."

➢ A brief resume of proposed work/problem:

India is one of those countries where agricultural as well as cattle farming is very common. These both play important role in economy of India. Due to covid-19 emergence in country lot of economic loss has been recorded due different reasons, and dairy industry is one of those. As there was strict lock down for citizens most of the husbandries were neglected due unhygienic conditions the more chances of buffaloes and cows is to get infected by different parasites or vectors.

This research is proposed to examine the role of ticks on health of buffalo and cattle at selective localities at Nanded district. Biology & identification of tick's species diversity on buffalo and cattle will also be examined during research by using suitable methods. The host specificity will also be examined.

➢ Introduction to proposed research topic:

All the living creatures live in a particular ecosystem, where they are directly or indirectly connected to each other. They all are depending on one another for different need. Different types of interaction between individuals like mutualism, commensalism, and parasitism etc., most of the arthropods acts as a pests or vectors for number of plants and animals. There are vast variety of ticks which are parasites of human beings and domestic animals etc. The ticks are pests of domestic animals dog, cat, cow, goat, sheep and buffalos etc.

The class Arachnida falls within the phylum Arthropoda (arthropods) and encompasses the following taxa: Acari (ticks and mites)(Tarrés-Call, 2013).There are three families of ticks comprising a total of at least 907 species of ticks: (i) Nutalliellidae, with a single species, Nutalliella namaqua; (ii) Argasidae, soft-bodied or soft ticks, with 186 species; and (iii) Ixodidae, hard-bodied or hard ticks, with 720 species considered to have valid genus and species names(Tarrés-Call,

2013).Ixodid and argasid ticks are obligate ectoparasites of a wide variety of terrestrial and flying vertebrates(Hoskins, 2015).In this study we will examine the infestation of ticks and mites on buffaloes and cows.

The ticks are major ectoparasite of buffaloes and cows, as they spread numbers of ill-effect on their health. Tick infestation results in reduced milk production levels and reduced feed conversion efficiency(Correa-Caldero´, 2002). In this study such ill-effect and impact of ticks on buffaloes or cow's health, effect on their milk yielding & composition, weight gaining capability is to be examined.

In this research the ticks on buffaloes and cattle's health at selective localities of Nanded District. The biology identification species diversity of ticks to be evaluated. The spificty of host will also be examined.

➢ Survey of review of literature and development in the relevant subject:

Extensively reared ruminants are seasonally exposed to ticks. Production losses and health issues related to ticks have been well documented in cows and sheep but not in goats where relevant literature is scarce. The intent here was to investigate the association of hard tick infestation with milk production and udder health of dairy goats reared extensively. A cross-sectional study was carried out during May and June, in two dairy goat farms. Consonance to the present study, tick infestation significantly contributes to udder health problems, though it does not seem to affect milk production of dairy goats reared in extensive farming systems in Greece country. Acquiring of prevention and available control measures to reduce tick infestation prevalence in dairy goat herds is expected to improve goats' under health status and, hence, be also beneficial in terms of production and financial stability. In further research taking into account tick infestation severity is recommended for assessing potential adverse effects on goat productivity and for establishing an economic threshold for tick infestation control (Vouraki.et.al., 2022).

Ticks are ectoparasites of vertebrate animals, which feed on their blood. The warm and humidity in climates favour their survival and activity, and infected pastures facilitate their transmission. By virtue of, extensively

reared ruminants in regions with such climatic conditions are periodically or even permanently challenged by hard tick infestation. This pattern is being modified following climate change, a situation which is expected to intensify the problem and broaden the geographical distribution of hard ticks in the future(Vouraki.et.al., 2022).

In developed and underdeveloped countries, ticks are important vectors transmitting various pathogens that cause diseases of veterinary and public health importance, like babesiosis, theileriosis, Crimean-Congo haemorrhagic fever (CCHF) and numerous. Lot of species of ticks has been reported in scientific literature from Pakistan, which needs to be listed for ready reference. In this context, a checklist of tick species recorded in Pakistan is presented here after comprehensive review of the available literature on the subject. Overall, nine genera and 53 species of ticks infesting animals in Pakistan are presented in this checklist(Ramzan.et.al., 2021).

Ticks are of major concern in the 21st century. There are increasing evidences that incriminate them in the transmission of disease pathogens to human and animals(Ramzan.et.al., 2021).

The study was carried out in Madurai district, Tamil Nadu State, South India. Ticks were collected from cows, dogs, goats, cats and fowls. The overall percentage of tick infestation in these domestic animals was 21.90%. The following ticks were identified: *Amblyomma integrum, Haemaphysalis bispinosa, Haemaphysalis paraturturis, Haemaphysalis turturis, Haemaphysalis intermedia, Haemaphysalis spinigera, Hyalomma anatolicum, Hyalomma brevipunctata, Hyalomma kumari, Rhipicephalus turanicus, Rhipicephalus haemaphysaloides* and *Rhipicephalus sanguineus*. The predominant species recorded from these areas is *R. sanguineus* (27.03%) followed by both *R (B.) microplus* (24.12%) and *R. (B.) decoloratus* (18.82%). The maximum tick infestation rate was recorded in animals from rural areas (25.67%), followed by semi-urban (21.66%) and urban (16.05%) areas. This study proved the predominance of hard ticks as parasites on domestic animals and will help the public health personnel to understand the ground-level situation and to take up necessary control measures to prevent tick-borne diseases(Ranganathan.et.al., 2021).

Tick borne zoonotic diseases are one of the major emerging threats to live stock and public health in India, especially in Western Ghats of south India. Since

livestock and wild animals share habitats and grasslands, it is important to know the species composition of major tick parasitism on live stock as well as their geographical distribution for effective control of tick and tick borne diseases. This study provides basic knowledge that is necessary to initiate Kyasanur Forest Disease (KFD) prevention programs in these areas. Ticks were sampled from Wayanad districts of Kerala from domestic animals and identified morphologically. A total of 195 cattle searched, in which 168 (86.15%) cattle were infested with ticks and a total of 3633 ticks comprising three genera and seven species were collected, Rhipicephalus microplus (52.71%) was prevalent species followed by Haemaphysalis bispinosa (16.9%), Rhipicephalus decoloratus (15.77%), Haemaphysalis turturis (11.42%), Rhipicephalus sanguineus (1.32%), Amblyomma integrum (1.15%) and Haemaphysalis spinigera (0.71%) were identified based on their morphological characters. As R. microplus was the prevalent species, the risk of transmission of babesiosis and anaplasmosis to cattle increases and the presence of Haemaphysalis sp. point out the risk of KFD in among the tribal colony people and it can be reduced by applying with acaricides on domestic animals(Balasubramanian.et.al., 2019).

Finding ixodid ticks on a vertebrate host often requires careful examination of all parts of the body. To inspect for ticks, it is necessary to use both the fingers and eyes to examine the animal; often a tick can be felt but not seen. Female ticks are ordinarily much larger than male ticks and are easier to find. Careful scrutiny of the area near the female tick frequently reveals a tiny male tick(Hoskins, 2015).

A number of argasid species that parasitize only wildlife, especially birds and bats, are known primarily from larvae. 6 Adult ticks of these species have not been sought in the areas of nests, caves, or other shelters. If for various reasons, one does not wish to disturb or destroy a potential host, argasid stages can be collected effectively from nesting and resting sites. Argasids are found in these sites on a year-round basis, regardless of whether hosts are present(Hoskins, 2015).

A cross-sectional study was conducted to determine the diversity and intensity of hard tick species infesting domestic buffalo and cattle from Haryana, India. 17 collections were performed from 10 allopatric populations during the

study period of August 2011 to January 2013. Out of a total number of 662 animals surveyed, 309 animals were found infested with ticks from three different genera of family Ixodidae and a total of 867 ticks were collected and identified. The study revealed that Hyalomma anatolicum and Rhipicephalus (Boophlilus) microplus are the most common vector species infesting buffalo and cattle in the Haryana state area. The level of infestation, the seasonal epidemiology of ticks and the associated management practices to adopt are discussed(Chhillar.et.al., 2014).

In view the economic impact of various ticks species on livestock, the present study was conducted for epidemiological characterize of common ticks infesting Indian zebu cattle between July 2010 and June 2011 period at various locations of Mathura zone of India. Subtotal of 2,515 zebu cattle were examined on random basis throughout the year. The total prevalence of ticks' infestation in cattle was 60.07 %. The highest prevalence was reported in September (75 %) while the lowest was in January (46.07 %). On seasonal investigation highest tick infestation was found in rainy season (69.46 %), followed by summer (62.55 %) while lowest in the winter (47.96 %). Overall highest percentage of tick infestations was noticed in the group I animals of less than 1 year age (80.21 %) followed by group II animals of age between 1 and 3 years (68.48 %) and lowest in group III animals of age greater than 3 years (44.85 %). On the basis of morphological studies, two species of ticks were identified namely Boophilus microplus and Hyalomma anatolicum anatolicum. The most common feeding sites for adult ticks were neck, axilla, belly, groin, udder, perineal regions and tail(Patel.et.al., 2012).

Relating to the whole world, ticks transmit a greater variety of pathogenic microorganisms, protozoa, rickettsiae, spirochaets, and viruses than any other arthropods and are among the most important vectors of diseases affecting livestock, humans, and companion grazing animals. Ticks and tick-borne diseases (TTBDs) affect 80% of the world cattle population and are widely distributed throughout the world, particularly in tropical and subtropical countries including India, Bangladesh, and Pakistan etc. Ticks and tick-transmitted infections have coevolved with various wild animal hosts, which constitute the reservoir hosts for ticks and tick-borne pathogens of livestock, pets, and human beings. In this region, the livestock sector is suffering from a number of disease problems caused by bacteria, viruses, fungi, and parasites. Among the parasitological problems, the

damage caused by TTBDs is considered very high, and the control of TTBDs has been given priority(Ghosh.et.al., 2007).

The genus *Hyalomma* is common in semi-arid regions such as China, Spain and Mauritania, where it is responsible for transmitting Theileria annulata, causing the disease known as tropical theileriosis. Boophilus species are one-host ticks and distribution includes all tropical and subtropical areas of the world(Correa-Caldero´, 2002).

Soft ticks of the family Argasidae, genus Ornithodoros, are vectors of endemic diseases caused by the pathogen Borrelia spp. Its distribution includes East, Central and South Africa, countries of the Mediterranean region (Portugal, Spain, North and West Africa) and it is extending eastwards through Cyprus, Israel, Iran, Central Asia and Kashmir to western China(Correa-Caldero´, 2002).

➢ Objectives of research and proposed Hypothesis:

- Prevalence of ticks amongst the buffaloes and cows will be examined in this study.
- Biology, Tick species diversity to be examined.
- In this study host specificity will also be examined.

➢ Methodology to be used and adopted:

- Ticks will be collected monthly intervals and its prevalence to be estimated.
- Collection is to be made by using forceps sifting etc., and method without causing harm to the animals and other suitable equipment will be used to collect ticks.
- The insects will be identified with the help of taxonomic methods using books like(Tarrés-Call, 2013), Identification key to the classes of adult arthropod (P.M. Choate), Manual: Collection, Preservation and Identification of Insects and Mites of Economic Importance (J. K. JONATHAN, P. KULKARNI, B. K. TIKADER).

- The proper methodology will be adopted for hypothesis testing like the infection causing stages will be noted, so as to understand the level of damage by that particular life stage.
- The life stages of ticks of buffaloes andcattle will be preserved using permanent slide method and liquid preservation method.

➢ Importance of study:

❃ International status:

- This research will help in identification of tick of at particular locality.
- Most of them are vectors for number of diseases.
- This research will be helpful for medical importance.
- It will be helpful for understanding the host specificity of ticks amongst buffaloes and cattle's breeds.

❃ National status:

- This research will be helpful for identification of species of ticks on buffaloes or cattle at selected areas at Nanded, dist.
- This will give an impact of ticks on body of buffaloes or cattle's health.
- Present study will also help to understand the host specificity of ticks of buffaloes & cattle at selected areas at Nanded, dist.

❃ Regional status:

- Research will help local cattle farmers to understand the causes of infestation.
- It will help local farmers to maintain the husbandry.
- Save veterinary expenses for treatment.

❃ Scope of study:

Present study will give information related diversity of ticks on body of buffaloes and cattle at cattle-shed of selected locality. It will also suggest the

hostspecificity of ticks of buffaloes & cattle. It will help in controlling mortality rate of buffaloes or cattle due to infections and diseases caused by ticks.

➢ Proposed work plan – with a tentative chapter scheme:

- Introduction
- Preference
- Literature review
- Geographical study area
- Materials and methods
- Results and discussion
- Summary and conclusion
- References

➢ Year-wise plan of work and target to be achieved:

- **First year,** Introduction, referencing collection and biology, taxonomy, identification of selected species of ticks ofbuffaloes and cows and preservation from the sheds of selected areas of Nanded, dist., locality.
- **Second year,** Identification of damage causing stages of ticks of buffaloes & cattle.
- **Third year,** Examine the host specificity of ticks of buffaloes & cattle.

➢ Expected outcomes:

- The species diversity of ticks of buffaloes & cattle.
- The host specificity of ticks of buffaloes and cattle may be specified.

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